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Paterson et al.

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[54] OPTICAL KEYBOARD WITH COMMON LIGHT TRANSMISSION MEMBERS

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[58] **Field of Search** ..... 400/477, 479, 472; 178/17 C, 17 D; 235/145 R; 250/221, 578; 340/365 P; 350/96.1, 96.15, 96.16, 301

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,603,982	9/1971	Patti	178/17 C
3,609,759	9/1971	Teske	340/365
3,758,197	9/1973	Klang et al.	350/96.1 X
3,796,880	3/1974	Dorey	250/209
3,856,127	12/1974	Halfon et al.	400/479
4,142,877	3/1979	Auracher et al.	350/96.15 X
4,311,990	1/1982	Burke	250/221

FOREIGN PATENT DOCUMENTS

1463246	11/1966	France	350/301

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin, vol. 23, No. 11, Apr. 1981, pp. 4998-4999, "Optical Keyboard", W. S. Duncan, et al.

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[57] **ABSTRACT**

A keyboard assembly (FIG. **1, 11**) is constructed of first light transmission members (**13**) second light transmission members (**15**), a key actuation assembly (**17**) having a matrix of keybuttons (**25**), plural light source assembly (**19**) and plural sensor assembly (**21**). Each light source on assembly (**19**) is exclusively and sequentially energized causing its light to be transmitted through the first light transmission member (**13**) to be split up and deflected downwardly by the surfaces (**43**) and then rightwardly by the surfaces (**45**) to emanate through the surfaces (**47**) to enter the surfaces (**49**) of the second light transmission member. Actuation of a keybutton (**25**) causes its associated interrupter (**29**) to assume a light blocking position between the first light transmission member (**13**) and a second light transmission member (**15**). Light passing through the second light transmission member (**15**) to the sensor array indicates that none of the interrupters (**29**) have blocked the light path. This geometrical arrangement provides N key rollover detection with phantom key lockout and the light transmission members (**13, 15**) may be made of a single part or a single part for each row or column. Such parts provide common light transmission paths.

5 Claims, 9 Drawing Figures